

**WE CLAIM:**

1. An isolated adipose tissue-derived adult stem cell differentiated to express at least one characteristic of a chondrocyte in combination with a viscous, biocompatible liquid material implanted into a host, wherein the host is in need of articular cartilage repair.

2. The cell of claim 1, wherein the biocompatible liquid is capable of gelling at body temperature.

3. The cell of claim 2, wherein the biocompatible liquid is selected from the group consisting of alginate, collagen, fibrin, hyaline, or plasma.

4. The cell of claim 1 in combination with a malleable, three dimensional matrix capable of filling an irregular cartilage defect.

5. The cell of claim 4, wherein the matrix is selected from the group consisting of polyglycolic-poly-lactic acid, poly-glycolic acid, poly-lactic acid, or suture-like material.

6. A composition comprising an isolated adipose tissue-derived adult stem cell differentiated to express at least one characteristic of a chondrocyte and implanted into host, a malleable, three dimensional matrix capable of filling an irregular cartilage defect and a solid phase, and a biocompatible material of sufficient structural integrity to serve as an anchor within the cancellous bone underlying the articular cartilage defect.

7. The composition of claim 6, wherein the biocompatible material comprises an isolated adipose tissue-derived stem cell differentiated to express at least one characteristic of an osteoblast.

8. The composition of claim 7, wherein the isolated adipose tissue-derived stem cell differentiated to express at least one characteristic of an osteoblast is grown in a matrix in vitro prior to implantation.

5 9. The cell of claim 1, wherein the cell is human.

10. The cell of claim 1, wherein the cell is modified with a nucleic acid.

10 11. A method of treating an articular cartilage defect in a host comprising implanting an isolated adipose tissue-derived adult stem cell differentiated to express at least one characteristic of a chondrocyte.

12. The method of claim 11, wherein the isolated adipose tissue-derived adult stem cell is in combination with a viscous, biocompatible liquid material.

15 13. The method of claim 12, wherein the biocompatible liquid is capable of gelling at body temperature.

20 14. The method of claim 13, wherein the biocompatible liquid is selected from the group consisting of alginate, collagen, fibrin, hyaline, or plasma.

15. The method of claim 13 further comprising a malleable, three dimensional matrix capable of filling an irregular cartilage defect.

25 16. The method of claim 15, wherein the matrix is selected from the group consisting of polyglycolic-poly-lactic acid, poly-glycolic acid, poly-lactic acid, or suture-like material.

30 17. A method of treating an articular cartilage defect in a host comprising implanting a composition comprising an isolated adipose tissue-derived adult stem cell differentiated to express at least one characteristic of a chondrocyte, a malleable, three

dimensional matrix capable of filling an irregular cartilage defect and a solid phase, biocompatible material of sufficient structural integrity to serve as an anchor within the cancellous bone underlying the articular cartilage defect.

5           18.    The method of claim 17 wherein the biocompatible material comprises an isolated adipose tissue-derived stem cell differentiated to express at least one characteristic of an osteoblast.

10           19.    The method of claim 18 wherein the isolated adipose tissue-derived stem cell differentiated to express at least one characteristic of an osteoblast is grown in an matrix in vitro prior to implantation.